



United States Steel Corporation
Mon Valley Works – Clairton Plant
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Michael S. Rhoads
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Clairton Plant

January 7, 2019

Ms. Jayme Graham
Air Quality Program Manager
Allegheny County Health Department
301 39th Street, Bldg. No. 7
Pittsburgh, PA 15201-1891

Via email and hard copy

Dear Ms. Graham:

RE: United States Steel Corporation – Mon Valley Works – Clairton Plant
Additional Information Regarding Breakdown Reports #21256, 2157, and 2158
No. 2 Control Room, No. 5 Control Room, and Battery Stacks

United States Steel is following up to our Friday, January 4th teleconference with the Allegheny County Health Department (ACHD) with regards to our Mitigation Plan to reduce any potential environmental impact regarding the above-referenced breakdowns.

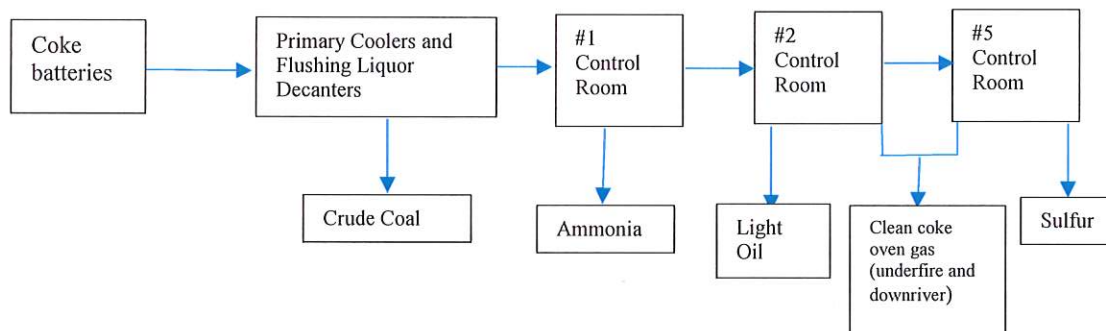
As you are aware, on December 24, 2018, at approximately 4:30 AM, U. S. Steel's Clairton plant experienced a significant fire which required the immediate shutdown of the No. 2 Control Room and No. 5 Control Room for the safety of employees and equipment. While the fire was successfully extinguished, as we discussed, the cause of the fire and damage it caused to processes and equipment remains under investigation. The emergency shutdown of the Nos. 2 and 5 control rooms requires the by-pass of coke oven gas to the downriver system. The affected buildings and related infrastructure are being evaluated for structural safety. Once the evaluation is complete; and any necessary measures employed based upon the evaluation, the buildings can be accessed to determine impacts and damage to the systems; and what actions will be needed to bring the facility back to normal operation.

U. S. Steel is employing significant resources around the clock to investigate the incident. While the investigation is being completed, we have expended and continue to expend substantial resources and costs to employ mitigation efforts to reduce any potential impacts from the incident. We remain committed to employing actions only when such actions can be done in a manner that is safe for our employees, contractors, and public and potential impacts to the environment are minimized. As we discussed on Friday, we would be pleased to have the ACHD visit the site to observe the area damaged by the fire and our mitigation efforts.

To date, among other efforts, we have utilized natural gas (displacing coke oven gas) to the extent practicable.

BACKGROUND INFORMATION REGARDING COKE OVEN GAS PROCESS

To better understand the breakdown and its impact of operations, a brief explanation of the coke oven gas process is provided. Coke oven gas is processed through a series of unit operations at the U. S. Steel Clairton plant to recover various by-products, and clean the coke oven gas for downstream fuel gas use. A simplified block flow diagram of the coke oven gas flow through these unit operations, and byproduct recovery at each unit operation is shown below:



The #2 control room process is a cryogenic gas separation facility, and light oil recovery facility. It consists of 24 main regenerator vessels which operate at very low temperatures (-258 F), which cool the coke oven gas and separate the gas into various streams for downstream fuel consumption and further by-product recovery, 16, two-stage, 1500 horsepower axial compressors, which provide vacuum and compression for the main regenerator unit operation, and light oil recovery process, and a light oil recovery plant, which is a series of heat exchangers, and another small cryogenic unit operation, consisting of 4 light oil regenerators that recover the light oil from the coke oven gas.

During normal operation, 100 percent of the coke oven gas must pass through the entire process up to #2 control room. At #2 control room, this coke oven gas stream is split into different gas streams, including (1) clean downriver coke oven gas, (2) clean underfire coke oven gas, and (3) carbonate feed gas. The clean downriver gas, goes to consumers throughout the Mon-Valley Works. The clean underfire gas is used to heat the batteries at Clairton. The carbonate feed gas represents approximately 15% of the total gas volume (~30 MMSCFD of gas flow for 11,700 tons/day of coke production). This carbonate feed gas stream is sent on to the #5 control room for sulfur removal. Once the sulfur has been removed from the carbonate feed gas, this gas is combined with the clean downriver gas, for downstream consumption.

Without the #2 Control room operation, the facility cannot operate the #5 control room process, because the operation of #2 control room is critical to separate and concentrate the acid gas components in the coke oven gas stream into a small fraction of the coke oven gas (15% of the total volume). The piping does not exist to go from #1 control room directly to #5 control room. In addition, #5 control room is not sized to handle this full flow of coke oven gas.

The area of fire damage at the Clairton plant is the #2 control room. The specific area of damage is the building that houses the 16 – two-stage, 1500 horsepower axial compressors. Within this

building, there are 4 lube oil cellars, each oil cellar provides lubrication oil to 4 of the 16 compressors. There is an overhead crane in this building, that provides lifting capability to perform maintenance on the 16 axial compressors housed in the building. There is a large amount of large diameter piping that directs the gases into and out of the compressor building, and significant utility infrastructure that supports this portion of the process.

MITIGATION PLAN

As we discussed on Friday, we have implemented the following work as part of our plan to mitigate the potential for environmental impacts and to bring the facility back to normal operation. While we are providing the Mitigation Plan in good faith and remain committed to employing sound practices and efforts to mitigate any potential impacts from the breakdown, implementation of these actions and any future actions are subject to change based upon the investigation and information that becomes available. In any event, we will keep the ACHD up-to-date on our actions.

Major Work Completed Since December 24, 2018 (as of 1/4/2019):

Safety, Fire Protection, and Process Stabilization:

1. PSM incident investigation started.
2. Asbestos abatement permit has been obtained.
3. Building Gas Monitoring System evaluation completed and repair plan being developed.
4. Hazardous Job Procedure completed for crane activities.
5. Building fire system inspection completed and repair plan being developed.
6. Underground fire system piping break has been repaired.
7. Keystone Fire Pump repairs completed.
8. Main regenerators temperatures are in control and spare deriming blower repairs are completed.

Structural and roofing demo:

1. Approximately 80% of structural inspections have been completed.
2. Approximately 50% of roof sheeting has been removed.
3. Approximately 50% of West wall sheeting has been removed.
4. Approximately 80% of roof structural members have been removed.
5. Truss fabrication bid package PO has been awarded.
6. Building Crane inspection is completed – there are no structural concerns but all electrical components are damaged and need to be replaced. Waiting for confirmation on delivery dates.

#2 CR Equipment

1. Three axial compressors are turning (appear to be operational once repairs to pumps, seals, and motors are complete).
2. Lube oil pump deliveries confirmed and orders placed.
3. Lube oil equipment in 593 oil cellars is being removed.
4. Axial compressor couplings on six machines has been removed for rebuild.
5. Additional two 400 series axial compressor have been sent out for repair.
6. Orders placed for additional blanks for fabrication of axial rotors.

Work Planned Moving Forward – Repairs planned for week of 1/6/2019:

1. We will continue to remove sections of the vacuum building roof, sheeting and structural members as required. We are finding additional damage as we remove roof sheeting to the roof structural members, that could not be seen from preliminary inspections. Building inspections are approximately 80% completed at this time.
2. Independent fire inspector will be on site on Tuesday to begin inspection. Anticipate this will be completed by end of the week.
3. We are pulling the first three motors off the pads (C530, C533, C539). We will continue working to de-wire and uncouple motors/compressors for eventual removal. As the investigation continues, we will disassemble and remove additional equipment.
4. Continue work on 593, 596, and 595 oil cellars (pump replacement and complete re-wire).
5. Continue work on identification of electrical scope/electrical inspections in the compressor building.
6. Continue work on vacuum building (B) crane inspection/repairs.

Long-term evaluations/ work planned:

1. 593 Lube Oil Cellar – needs to be completely re-wired, pumps need to be changed (was completely flooded)
2. 594 Lube Oil Cellar – needs to be completely re-wired, pumps need to be changed (was completely flooded)
3. 595 Lube Oil Cellar – needs to be completely re-wired, pumps need to be changed (was completely flooded)
4. 596 Lube Oil Cellar – needs to be completely re-wired, pumps need to be changed (was completely flooded)
5. 14 - Axial compressors need to be inspected (compressors and all piping), and the damaged compressors need to be removed. There were not compressors on C500 or C545 (sub2) bases, as these machines were in process of being rebuilt at the time of the event.

At minimum, we know we have damage to the following axial compressors:

- C506 (both stages)
- C512 (both stages)
- C515 (both stages)
- C518 (both stages)
- C521 (both stages)
- C524 (both stages)
- C527 (both stages)
- C530 (is not turning – need to inspect/test seal functionality if we can get free)
- C533 (is not turning – need to inspect/test seal functionality if we can get free)
- C539 (both stages)
- C548 sub2 (both stages)

6. Need to inspect seals on C503, C509, C542. If these seals are intact – it appears that these compressors are viable to operate.
7. **We need a minimum of 6 functional compressors for partial re-start of the #2 CR gas separation facility. To mitigate, we plan to employ a partial re-start of the #2 CR when conditions allow.**
8. All 16 - 1500 horsepower motors must be removed from the building, sent out to a rehabilitation shop (IPS) and inspected and dried out/repared as needed.
9. Inspect and repair all piping/expansion joints on East and West sides of the vacuum building, and piping outside the west wall (including main sub valves and associated equipment).
10. Replace gas hazard detection/alarm system – which was damaged during the fire event.
11. Repair the compressor building EOT crane – which sustained significant electrical damage during the fire event.

Mitigation Methods Currently Implemented for SO2 Control:

1. We are currently operating 6 stabilized natural gas jets to offset 39 MMSCFD of coke oven gas equivalent to Clairton underfire system. This is maximum make up with existing installed equipment.
2. We are currently flaring as much coke oven gas as possible, given current system demands at the peach tree and Irvin ground flares – and making this gas up with purchased natural gas.
3. We extended coking times on 13-15, 19-20, and B/C Batteries due to gas quality.
4. On Friday 1/4/2019, we re-configured the Clairton boiler fuel supply – to operate both high pressure boilers on A line supply. A line is mixed gas (natural gas + coke oven gas) from the Mixing Station, prior configuration, one boiler was on A line mixed gas, the other was on B line - 100% coke oven gas. This is the normal practice, in the event of a fuel supply line disruption, so you don't risk tripping both high pressure boilers.

Consideration of Possible Additional Mitigation Steps:

As we discussed, we understand ACHD's expectation that U. S. Steel consider additional mitigation steps in the event data indicate that such measures are warranted. Currently we are installing an additional natural gas jet to re-direct additional natural gas (to displace coke oven gas) to the underfire system at Clairton. This is expected to offset an additional 20 MMCF of coke oven gas.

We are investigating other mitigation steps to be taken including:

1. Feasibility of increased natural gas flow to Clairton boilers.
2. Continue to evaluate processes and operations to identify ways to minimize environmental impact and ensure battery integrity and stack compliance.

Operating Data Summary

During the call on Friday, we agreed to provide ACHD with a summary of our operating data.

Table 1. Summary of coking times, normal vs. current operations.

| Battery | Normal Coking Time (hrs) | Current Coking Time (hrs) |
|----------------|---------------------------------|----------------------------------|
| 1 | 22 | 22 |
| 2 | 22 | 22 |
| 3 | 22 | 22 |
| 13 | 18 | 21* |
| 14 | 18 | 21* |
| 15 | 18 | 21* |
| 19 | 18 | 22 |
| 20 | 18 | 22 |
| B | 18 | 18.5 |
| C | 18 | 18.5 |

*Coking times adjusted on 1/7/2019 for Batteries 13-15.

Table 2. Summary of fuel percentages, normal vs. current operations.

| Emission Units | Normal Operating Fuel Usage | | | Current Operating Fuel Usage | | |
|------------------------|------------------------------------|----------------------|--------------------------|-------------------------------------|----------------------|--------------------------|
| | <i>Natural Gas</i> | <i>Coke Oven Gas</i> | <i>Blast Furnace Gas</i> | <i>Natural Gas</i> | <i>Coke Oven Gas</i> | <i>Blast Furnace Gas</i> |
| Clairton Underfire Gas | -- | 100% | -- | 40% | 60% | -- |
| Clairton No. 1 Boiler | 13% | 87% | -- | 40-50% | 50-60% | -- |
| Clairton No. 2 Boiler | -- | 100% | -- | 40-50% | 50-60% | -- |
| ET Boilers | -- | 4% | 96% | 2-3% | 2-3% | 90-95% |
| ET Blast Furnaces | 50% | 50% | -- | 100% | -- | -- |
| ET No. 1 Stove | -- | 1-2% | 98-100% | 1% | 1% | 98-100% |
| ET No. 3 Stove | -- | 1-2% | 98-100% | 1% | 1% | 98-100% |
| Irvin No. 1 Boiler | 5-10% | 90-95% | -- | 90-95% | 5-10% | -- |
| Irvin Hot Strip Mill | 25% | 75% | -- | 40-50% | 50-60% | -- |
| Irvin No. 2 Boiler | 5-10% | 90-95% | -- | 90-95% | 5-10% | -- |
| Irvin No. 3 Boiler | 5-10% | 90-95% | -- | 90-95% | 5-10% | -- |
| Irvin No. 4 Boiler | 5-10% | 90-95% | -- | 90-95% | 5-10% | -- |
| Irvin HPH Annealing | 5-10% | 90-95% | -- | 90-95% | 5-10% | -- |

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|----------------------------|-------|--------|----|--------|-------|----|
| Irvin OCA Annealing | 5-10% | 90-95% | -- | 90-95% | 5-10% | -- |
| Irvin Continuous Annealing | 5-10% | 90-95% | -- | 90-95% | 5-10% | -- |
| Irvin No. 1 Galvanize | 100% | -- | -- | 100% | -- | -- |
| Irvin No. 2 Galvanize | 100% | -- | -- | 100% | -- | -- |

While we are expediting our efforts to bring the facility back to normal operation, we remain committed to employing actions only when such actions can be done in a manner that is safe for our employees, contractors, and public; and potential impacts to the environment are minimized.

Also, as we discussed on Friday, we remain committed in openly communicating with the ACHD regarding this matter; and we welcome ACHD to visit the Clairton plant to observe the area impacted by the fire and mitigation efforts to date. Please contact Mike Dzurinko at (412) 233-1467 to schedule a meeting. In the interim, if you have any questions regarding this correspondence, please contact Mike Dzurinko or me.

Sincerely,



Michael S. Rhoads

cc: Jim Kelly (ACHD)
Jason Willis, Esq. (ACHD)
Mike Dzurinko (USS)
Chip Babst, Esq. (Babst Calland)
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